

Application Number 10/534,633  
Amendment dated May 24, 2007  
Response to Office Action of February 28, 2007

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**Remarks/Arguments**

Applicant respectfully thanks Examiner for allowing Claims 15-21.

**Claims Rejections – 35 USC 102(e)**

Claims 1, 6-8 and 13-14 stand rejected under USC 102(e) as being anticipated by Sung (2003/0168957).

Examiner states that Sung discloses a thermotunneling device comprising a collector electrode and an emitter electrode, the collector electrode having a surface facing the emitter electrode, characterised in that an insulator layer covers the surface of the collector electrode and is separated from the emitter electrode by a distance greater than zero.

As Examiner states, the insulating amorphous diamond material is indeed coupled to an electrode as shown in Fig. 2. Without belaboring the earlier debate between Applicant and Examiner over the understanding of the terms anode and cathode, the electrode to which the insulator is coupled must be an electron emitting electrode. This is seen by the fact that the surface of diamond material 15 attached to this electrode is described as the emission surface (see paragraph [0047]). The insulator surface cannot be an emission surface without the electrode it is attached to being an emission electrode. Therefore, in Sung's disclosure the insulator layer covers the surface of the *emitter* electrode.

A vacuum space 35 separates the emission surface from the anode (see paragraph [0047]). Having clarified the emission surface as belonging to the insulator and being attached to the emitter electrode the anode must comprise the collector electrode. The insulator is thus separated from the collector electrode by a distance greater than zero, as shown in Fig. 2. This is further made obvious by the fact that a gate 45 is disposed between the insulator and anode/collector electrode, making quite clear that the distance between the collector electrode and insulator must be greater than zero.

In summary, Sung discloses a device comprising a collector electrode and emitter electrode, the collector electrode having a surface facing the emitter electrode, characterised in that an insulator

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layer covers the surface of the *emitter* electrode and is separated from the *collector* electrode by a distance greater than zero.

The device disclosed by Sung is thus precisely the inverse of the device described by the Applicant.

Furthermore, in paragraph [0053], Sung teaches 'coating the metal electron emitter' of a fluorescent light bulb as a possible application of the invention. Clearly, then, the invention teaches the electron emitter electrode to be the coated electrode since paragraph [0053] is only a suggested application of the invention, not an entirely different formulation of it. This further supports the assertion that Sung discloses a thermotunneling device in which the emitter electrode is coated by an insulator, rather than the collector electrode as in the present invention.

Examiner notes that Claims 1 and 8 do not disclose how the emitter and collector electrodes function and therefore do not distinguish over Sung. Applicant appreciates Examiner's guidance and Applicant has accordingly amended claims 1, 4 and 8 in order to clarify the scope of what is claimed.

In light of the above, Applicant respectfully suggests that Sung does not anticipate the present invention in Claims 1 and 8. Furthermore, Applicant believes that Claims 6 and 7, because of their dependency on Claim 1 and Claims 13 and 14, because of their dependency on Claim 8, are not anticipated by Sung.

Furthermore, with regard to Claims 7 and 14, Examiner suggests that Sung discloses the limitation in which the collector electrode comprises a metal. Claims 7 and 14 therefore stand rejected under 35 USC 102(e) as being anticipated by Sung.

Examiner refers to paragraph [0053] in support of the objection. In this paragraph, only the metal electron emitter is referred to and no reference is made to the collector electrode.

Applicant therefore respectfully suggests that Sung does not anticipate the present invention in Claims 7 and 14.

Applicant respectfully requests that Examiner withdraw his rejection of claims 1, 6-8 and 13-14 under 35 USC 102(e).

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### Claims Rejections – 35 USC 103

Claims 2, 3, 4, 5, 9, 10, 11, 12 stand rejected under 35 USC 103 as being unpatentable over Sung (2003/0168957) in view of Huffman (3169200).

In view of the amendment made to Claims 1 and 8 and the corresponding arguments made above Applicant believes that claims 2,3,4,5,9,10,11,12 are patentable over the prior art of Sung.

Furthermore, Sung specifically teaches away from Huffman in some aspects of the present invention. Applicant therefore believes that, independent of the amendments to Claims 1 and 8, several of the claims rejected under 35 USC 103 are patentable over the prior art of Sung.

With regard to Claim 4, Examiner states that Sung discloses all the subject matter claimed except for the limitation in which a distance between the emitter and collector electrode is in the range of 10 – 200 Å, the latter being obvious to one skilled in the art in view of Huffman. A similar argument is made in regard to Claim 12.

However, in paragraph [0043] of 2003/0168957 Sung gives possible values for the asperity of the insulator surface as 1000 or 10000 nanometers. These values are equivalent to 10000 or 100000 Å. Since the insulator layer is disposed between the emitter and collector electrodes, this precludes an inter-electrode separation in the range of 10 – 200 Å. Thus, Sung teaches away from Huffman in this aspect of the invention and Applicant therefore believes that Claims 4 and 12 are patentable over Sung in view of Huffman.

With regard to Claim 5, Examiner states that Sung discloses all the subject matter claimed except for the limitation in which the emitter electrode is separated from the insulator by a distance in the range of 5 – 50 Å. Examiner believes that this limitation is obvious to one skilled in the art in view of Huffman. A similar argument is made in regard to Claim 11.

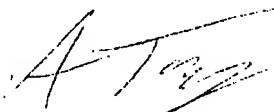
Firstly, as noted above, Sung discloses a device in which the emitter electrode is covered by the insulator rather than separate from it. However, for argument's sake, let us replace the term emitter electrode by 'second electrode' from which the insulator is separated. The values for the asperity of the insulator surface quoted by Sung (paragraph [0043]) far exceed the separation that Examiner believes is obvious in light of Huffman. Applicant thus believes that Sung teaches

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away from Huffman in this aspect of the invention and Applicant therefore respectfully suggests that Claims 5 and 12 are patentable over Sung in view of Huffman.

No new material is entered by these amendments, and Applicant respectfully submits that this application, as amended, is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that discussing the application the Applicant over the telephone might advance prosecution, Applicant would welcome the opportunity to do so.

Respectfully submitted,



Avto TAVKHELIDZE  
Inventor